WE CLAIM:

1. A method for connecting Internet Protocol (IP) devices through an Open System Interconnection (OSI) network that includes a plurality of network elements, comprising the steps of:

receiving at a first network element a first IP packet having IP origination and destination addresses to be forwarded through the OSI network to a second network element that is adapted to forward the IP first packet toward the IP destination address;

encapsulating the first IP packet in an OSI packet and broadcasting the OSI packet to each network element in the OSI network that supports a TCP/IP gateway;

receiving the OSI packet at each of the network elements that support a TCP/IP gateway, recording OSI origination address, removing the encapsulated IP packet and recording IP origination and destination addresses; and

forwarding the IP packet over a TCP/IP link supported by the TCP/IP gateway.

2. A method as claimed in claim 1, further comprising steps of:

on receiving an IP packet having corresponding IP origination/destination addresses on the TCP/IP link, encapsulating the IP packet in an OSI packet, inserting the recorded OSI address as a destination address of the OSI packet, and forwarding the OSI packet through the OSI network

to enable a direct exchange of IP packets between the origination and destination IP addresses.

3. A method as claimed in claim 1, wherein the step of encapsulating the first IP packet comprises a step of encapsulating the first IP packet in a connectionless network protocol (CLNP) packet and setting a network layer selector (NSEL) value in a header of the OSI packet to a predetermined value used to indicate CLNP packets that carry IP packets.

4. A method as claimed in claim 1, wherein the step of broadcasting further comprises a step of using a predefined list of addresses of the network elements that support a TCP/IP gateway when a broadcast mechanism is not available.

5. A method as claimed in claim 1, wherein the step of recording the origination and destination addresses further comprises steps of creating and maintaining a look-up table.

6. A method as claimed in claim 5, wherein the steps of recording OSI and IP addresses further comprises steps of recording a timestamp associated with each record and maintaining records in the look-up table for a predefined period of time after an exchange of IP packets has ceased.

7. A method as claimed in claim 6, wherein the step of maintaining records in the look-up table further comprises a step of periodically examining the timestamp of each record in the look-up table, and

deleting any record having a timestamp that is prior to a predetermined time.

8. A method as claimed in claim 7, further comprises a steps of:

receiving an OSI packet that includes an encapsulated response IP packet at the first network element;

extracting the OSI origination address of the second network element from the OSI packet;

removing the response IP packet from the OSI packet and origination/destination addresses of the response IP packet;

searching the look-up table of the first network element for a record in the look-up table having IP origination/destination addresses that match the IP destination/origination addresses of the response IP packet;

recording the OSI origination address of the second network element as a destination address in the record, and updating a timestamp associated with the record if a match is found; and

forwarding the response IP packet over a TCP/IP link connected to the first IP gateway.

9. A method as claimed in claim 8, wherein the steps of receiving and forwarding packets further comprises a step of updating the timestamp in the look-up tables of the first and the second network elements.

10. A method as claimed in claim 8, further comprises a step of controlling a bit rate at which IP packets are transferred between two network elements.

11. A method as claimed in claim 10, wherein the step of controlling the bit rate further comprises a step of storing OSI packets with encapsulated IP packets in a buffer of the respective first and second network elements.

12. A method as claimed in claim 8, wherein the step of receiving further comprises steps of:

receiving at the first network element a subsequent IP packet having IP origination and destination addresses;

extracting the destination address of the a subsequent IP packet;

searching in the look-up table of the first network element for a record that has the destination address of the subsequent IP packet;

retrieving the destination address of the OSI network element that is associated with the destination address of the subsequent IP packet;

updating the timestamp in the record;

encapsulating the subsequent IP packet in an OSI packet; and

inserting the retrieved OSI address as an OSI destination address in the OSI packet and forwarding the OSI packet with the subsequent IP packet to the second network element.

13. A method as claimed in claim 12, wherein the step of forwarding the OSI packet further comprises steps of:

receiving an OSI packet that includes the encapsulated subsequent IP packet at the second network element;

removing the subsequent IP packet from the OSI packet;

extracting the IP origination/destination addresses from the second IP packet;

searching the look-up table of the second network element for a record in the table having IP origination/destination addresses that match those of the subsequent IP packet;

updating a timestamp if a match is found; and

forwarding the subsequent IP packet over the TCP/IP link.

14. Apparatus for connecting Internet Protocol (IP) devices through an Open System Interconnection (OSI) network having a plurality of network elements, comprising:

a plurality of OSI network elements interconnected by at least one optical fiber for transmitting information through the OSI network using OSI packets;

at least first and second network elements including:

a TCP/IP interface for sending and receiving IP packets;

a table for recording information about addresses of IP packets that are received and sent, an origination address of OSI packets with encapsulated IP packets that are received and sent, and a timestamp associated with

each record in the table, the timestamp representing a time associated with sending or receiving an IP packet to an IP origination/destination address in the record; and

an application adapted to:

originate the destination OSI address of a network element associated with an IP destination address of or an IP packet,

encapsulate IP packets in OSI packets,

extract IP packets from an OSI packet, and

maintain the table.

15. An apparatus as claimed in claim 14, wherein the application at the first network element to originate the destination OSI address of the second network element that is associated with a destination address of IP packets is further adapted to:

extract origination and destination addresses from the first IP packet;

record the origination and destination addresses of the first IP packet and a timestamp;

encapsulate the first IP packet that is received at the first network element in a first OSI packet and broadcast the first OSI packet to each network element;

receive a second OSI packet with an encapsulated second IP packet from the second network element that is associated with the IP destination address of the first IP packet;

extract the OSI origination address of the second OSI packet;

remove the second IP packet from the second OSI packet; and

extract the IP origination and destination addresses of the second IP packet, search the table of the first network element for a record that has a destination address of the first IP packet and write the origination address of the second OSI packet as an OSI destination address in the record along with a time stamp.

16. An apparatus as claimed in the claim 15, wherein the application of the second network element is further adapted to:

receive the first OSI packet that includes the encapsulated first IP packet at the second network element;

remove the first IP packet from the first OSI packet;

extract the OSI origination address from the first OSI packet and IP origination/destination addresses from the first IP packet;

record the origination address of the first OSI packet and the IP origination/destination addresses of the first IP packet along with a timestamp;

forward the first IP packet over a TCP/IP link.

17. An apparatus as claimed in claim 14, wherein the application is further adapted to encapsulate the IP

packets in connectionless network protocol (CLNP) OSI packets.

18. An apparatus as claimed in claim 17, wherein the application is further adapted to insert a predetermined network selector (NSEL) value into a header of the CLNP packet to indicate that the CLNP packet carries an IP packet.

19. An apparatus as claimed in claim 17, wherein the application of the first network element is further adapted to:

receive a subsequent IP packet having IP origination and destination addresses;

extract the destination address of the subsequent IP packet;

search the table for a record that contains the IP destination address of the subsequent IP packet;

retrieve the OSI address of the OSI network element that is associated with the IP destination address of the subsequent IP packet;

update the timestamp in the record;

encapsulate the subsequent IP packet in an OSI packet; and

insert the retrieved OSI address as a destination address in the OSI packet and forward the OSI packet with the encapsulated IP packet to the second network element.

20. An apparatus as claimed in claim 19, wherein the application of the second network element is further adapted to:

receive an OSI packet that includes the encapsulated subsequent IP packet at the second network element;

remove the subsequent IP packet from the OSI packet;

extract the OSI origination address from the OSI packet and IP origination/destination addresses from the subsequent IP packet;

search the table for a record containing the IP origination/destination addresses of the subsequent IP packet;

update a timestamp if a match is found; and

forward the subsequent IP packet over the TCP/IP link.

21. An apparatus as claimed in claim 14, wherein a network element receives and sends IP packets using an Ethernet connection through a TCP/IP gateway.

22. An apparatus as claimed in claim 14, wherein the application is further adapted to periodically examine the timestamp of each record in the table and delete any record having a timestamp that is prior to a predetermined time.

23. An apparatus as claimed in the claim 14, wherein the application is further adapted to control a bit rate at which IP packets are transferred between two network elements.